

METHOD AND APPARATUS FOR ADJUSTING  
AND POSITIONING AIR CAPS

Field of the Invention

5 This invention relates to equipment for the setup of equipment for atomizing and dispensing fluent materials, such as coatings and the like.

Background of the Invention

Automatic spray equipment is well known in the prior art. There are,  
10 for example, the devices illustrated and described in U.S. Patents: 4,744,518; 4,915,303; 5,044,564; 5,279,461; 5,322,221; 5,344,078; and 5,456,414, and the references cited therein. The disclosures of these references are hereby incorporated herein by reference. No representation is intended by this listing that this is a complete listing of all pertinent prior art, or that a thorough search of all pertinent  
15 prior art has been conducted, or that no better prior art exists. Nor should any such representation be inferred.

Many automatic spray dispensers are pneumatic dispensers. That is, compressed gases or mixtures of gases, typically compressed air, are used in the atomization and dispensing of the materials they spray. Typically, jets of air are  
20 directed onto two opposite sides of a jet of the material to be atomized and dispensed, assisting in the atomization of the material and shaping the atomized material into somewhat of a fan shape, fanning out from the orifice of the nozzle through which the material is dispensed. The portion of a dispenser which directs the opposed air jets onto the stream of material being dispensed through the nozzle is generally referred to  
25 as an air cap. Such an air cap typically includes a pair of projections, sometimes called horns, which contain passageways and orifices through which the shaping air is directed onto the stream of material. The streams of air flowing onto the two opposite surfaces of the stream of material flatten it into a somewhat elliptical cross-section, fan shaped pattern. In automatic coating dispensing equipment, generally,  
30 equipment which is not manipulated by a human operator, the dispenser is usually set up so that the long dimension of the cross section of the fan shaped pattern is oriented either horizontally (sometimes hereinafter referred to as a horizontal fan spray) or

vertically (sometimes hereinafter referred to as a vertical fan spray), depending upon the requirements and/or preferences of a particular application. In the past, this has meant using sometimes cumbersome devices and methods to establish that the air cap is properly oriented to produce a horizontal fan spray or a vertical fan spray.

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#### Disclosure of the Invention

According to one aspect of the invention, a device is provided for positioning an air cap having air horns extending therefrom on a pneumatically aided atomizer. The device includes at least one first opening adapted to receive the horns  
10 and a first level for indicating when the horns received in the at least one first opening are in a first orientation.

Illustratively according to this aspect of the invention, the device further includes at least one second opening adapted to receive the horns and a second level for indicating when the horns received in the at least one second opening are in  
15 the first orientation.

Further illustratively according to this aspect of the invention, the at least one second opening and second level are oriented orthogonally with respect to the at least one first opening and first level, respectively, so that the second level indicates when the horns received in the at least one first opening are in a second orientation orthogonal to the first orientation.  
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Additionally illustratively according to this aspect of the invention, the device includes a first surface extending generally in a first direction when the horns are received in the at least one first opening and a second surface extending generally in a second direction opposite the first direction when the horns are received in the at  
25 least one first opening.

Illustratively according to this aspect of the invention, the device includes a first surface extending generally in a first direction when the horns are received in one of the at least one first opening and the at least one second opening and a second surface extending generally in a second direction opposite the first direction when the horns are received in one of the at least one first opening and the at  
30 least one second opening.

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Further illustratively according to this aspect of the invention, the at least one first opening extends through the device from the first surface to the second surface.

Additionally illustratively according to this aspect of the invention, the 5 at least one second opening extends through the device from the first surface to the second surface.

Illustratively according to this aspect of the invention, the device includes at least a third surface extending between the first and second surfaces. The 10 third surface is configured to facilitate manipulation of the air cap when the horns are received in one of the at least one first opening and the at least one second opening.

According to another aspect of the invention, a method is provided for positioning an air cap having air horns extending therefrom on a pneumatically aided atomizer. The method includes providing a device having at least one first opening adapted to receive the horns and a first level for indicating when the horns received in 15 the at least one first opening are in a first orientation.

Illustratively according to this aspect of the invention, providing a device having at least one first opening adapted to receive the horns and a first level for indicating when the horns received in the at least one first opening are in a first orientation includes providing a device having at least one first opening adapted to 20 receive the horns, at least one second opening adapted to receive the horns, a first level for indicating when the horns received in the at least one first opening are in the first orientation, and a second level for indicating when the horns received in the at least one second opening are in the first orientation.

Further illustratively according to this aspect of the invention, 25 providing a device having at least one first opening adapted to receive the horns, at least one second opening adapted to receive the horns, a first level for indicating when the horns received in the at least one first opening are in the first orientation, and a second level for indicating when the horns received in the at least one second opening are in the first orientation includes providing a device having at least one first opening adapted to receive the horns, at least one second opening adapted to receive the horns 30 and oriented orthogonally with respect to the at least one first opening, a first level for indicating when the horns received in the at least one first opening are in the first

orientation, and a second level oriented orthogonally with respect to the first level for indicating when the horns received in the at least one second opening are in the first orientation.

Additionally illustratively according to this aspect of the invention,  
5 providing a device having at least one first opening adapted to receive the horns and a first level for indicating when the horns received in the at least one first opening are in a first orientation includes providing a device having a first surface extending generally in a first direction when the horns are received in the at least one first opening and a second surface extending generally in a second direction opposite the  
10 first direction when the horns are received in the at least one first opening.

Illustratively according to this aspect of the invention, providing a device having at least one first opening, a first surface extending generally in a first direction when the horns are received in the at least one first opening and a second surface extending generally in a second direction opposite the first direction when the  
15 horns are received in the at least one first opening together include providing at least one first opening which extends through the device from the first surface to the second surface.

Further illustratively according to this aspect of the invention,  
providing a device having at least one first opening adapted to receive the horns and a  
20 first level for indicating when the horns received in the at least one first opening are in a first orientation and at least one second opening adapted to receive the horns and a second level for indicating when the horns received in the at least one second opening are in a first orientation together include providing a device including a first surface extending generally in a first direction when the horns are received in one of the at  
25 least one first opening and the at least one second opening and a second surface extending generally in a second direction opposite the first direction when the horns are received in one of the at least one first opening and the at least one second opening.

Additionally illustratively according to this aspect of the invention,  
30 providing a device having a first surface extending generally in a first direction when the horns are received in the at least one first opening and a second surface extending generally in a second direction opposite the first direction when the horns are received

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in the at least one first opening include providing a device including at least a third surface extending between the first and second surfaces, the third surface configured to facilitate manipulation of the air cap when the horns are received in the at least one first opening.

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#### Brief Description of the Drawings

The invention may best be understood by referring to the following detailed description and accompanying drawings which illustrate the invention. In the drawings:

10 Fig. 1 illustrates a perspective view of a device constructed according to the invention;

Fig. 2 illustrates a perspective view of the device illustrated in Fig. 1 being placed on an air cap of an automatic spray gun with the air cap generally oriented to produce a horizontal fan shaped spray;

15 Fig. 3 illustrates a perspective view of the device illustrated in Fig. 1 on an air cap of an automatic spray gun;

Fig. 4 illustrates a perspective view of the device illustrated in Fig. 1 illustrating how the device can be used to reorient an air cap of an automatic spray gun from an orientation to produce a horizontal fan shaped spray to an orientation to 20 produce a vertical fan shaped spray or from an orientation to produce a vertical fan shaped spray to an orientation to produce a horizontal fan shaped spray;

Fig. 5 illustrates a perspective view of the device illustrated in Fig. 1 being placed on an air cap of an automatic spray gun with the air cap generally oriented to produce a vertical fan shaped spray.

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#### Detailed Descriptions of Illustrative Embodiments

A device 10 is provided for orienting an air cap 12 of an automatic applicator or spray gun 14. As illustrated in Figs. 2 and 5, spray gun 14 includes air cap 12 having horns 16 which protrude forward from a front face 18 of the air cap 12.

30 Horns 16 include air passages which terminate at orifices 19, only one of which is illustrated in each of Figs. 2 and 5, for aiding in the atomization and shaping of a spray of atomized fluid particles, such as liquid coating material particles. The air cap

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12 is capable of being oriented with horns 16 in any orientation, for example, with the  
axis which extends between them vertical, as illustrated at 20 in Fig. 2, with the axis  
which extends between them horizontal, as illustrated at 22 in Fig. 5, or anywhere in  
between. This is generally done by loosening the nut 23 that binds the air cap 12  
5 frictionally against the front face of the gun 14, thus freeing the air cap 12 from  
frictional engagement with the gun 14, turning the air cap 12 to the desired  
orientation, and tightening the nut 23 to again bind the air cap 12 frictionally against  
the front face of the gun 14. For automatic guns, generally the vertical orientation of  
the horns 16 illustrated in Fig. 2, and the horizontal orientation of the horns 16  
10 illustrated in Fig. 5 are the most commonly encountered orientations. The vertical  
orientation of the horns 16 illustrated in Fig. 2 generally results in a somewhat fan-  
shaped, somewhat elliptical-cross section coating material spray having a long  
dimension which extends generally horizontally. The horizontal orientation of the  
horns 16 illustrated in Fig. 5 generally results in a somewhat fan-shaped, somewhat  
15 elliptical-cross section coating material spray having a long dimension which extends  
generally vertically. Device 10 is provided to aid a user in adjusting and properly  
positioning the horns 16 of air cap 12.

Device 10 includes a body 26 which has a shape which provides for  
easy gripping and manipulation of the device 10 by a worker who is setting up the gun  
20 14 for a spraying operation. Illustratively, the body 26 is generally right rectangular  
prism-shaped, having four rectangular side faces 30, 32, 34, 36 and two square end  
faces 40, 42. At the edges 44, 46 between two adjacent side faces 30, 32 and one, 40,  
of the end faces, two levels 50, 52 which may, for example, be bubble tubes from  
spirit levels, mercury levels, or the like, are provided. Two intersecting orthogonal  
25 slots 56, 58 extend completely through body 26 from end face 40 to end face 42. The  
orthogonal slots 56, 58 may be sized to receive the horns 16 of air caps 12 of multiple  
standard sizes, or slot 56 may be sized to receive the horns 16 of air caps 12 of one or  
more standard sizes and slot 58 sized to receive the horns 16 of air caps 12 of one or  
more different standard sizes. Alternatively, slots 56 can be tapered from a size which  
30 receives one or more standard size horns 16 on one face 40 to a size which receives  
one or more other standard size horns 16 on the other face 42, and slot 58 can be  
tapered from a size which receives yet a third standard size horns 16 on one face 40 to

a size which receives a fourth standard size horns 16 on the other face 42.

Alternatively, different devices 10 may be provided for air caps 12 having different size horns 16.

The levels 50, 52 are so oriented in the body 26 that when the horns 16  
5 of an air cap 12 engage one, 56, of the orthogonal slots 56, 58, and the horns 16 are  
oriented vertically, along axis 20 in Fig. 2, one, 50, of the levels 50, 52 indicates level,  
and when the device 10 is then turned ninety degrees with the horns 16 of the air cap  
12 still engaging that slot 56, the other level 52 indicates level. Similarly, when the  
horns 16 of an air cap 12 engage slot 58 and the horns 16 are oriented vertically, level  
10 52 indicates level, and if the device 10 is then turned ninety degrees with the horns 16  
of the air cap 12 still engaging that slot 58, the other level 50 indicates level.

Of course, the device 10 need only have one slot rather than two  
orthogonal slots 56, 58. Two orthogonal slots 56, 58 are provided in the illustrated  
device 10 for convenience. The two orthogonal slots 56, 58 also could be sized to  
15 accommodate different standard sizes of air horns 16. Also, it is not necessary for the  
device 10 to have two levels 50, 52. One level may be sufficient if, for example, two  
orthogonal slots 56, 58 are provided, or if air caps 12 are only to be oriented in one  
orientation using it.

It should also be understood that, although the illustrated device 10 is  
20 designed to indicate when the horns 16 of an air cap 12 are oriented along vertical  
axis 20 illustrated in Fig. 2 or along horizontal axis 22 illustrated in Fig. 5, devices 10  
can be provided which indicate other orientations of the horns 16 as well, for  
example, 45 ° in one or the other direction from vertical or horizontal. It should also  
be understood that while slots 56, 58 in the illustrated embodiment are sized to  
25 receive both horns 16 of an air cap 12, separate openings could be provided for each  
horn 16. It should further be understood that while slots 56, 58 extend all the way  
through body 26, separate blind openings for horns 16 could be provided in each face  
40, 42, or blind openings for horns 16 could be provided in only one face 40 or 42.

Device 10 is of a size which facilitates gripping of device 10 by a  
30 worker to maintain the orientation of the air cap 12 while the nut 23 is being  
tightened, so that the adjusted orientation of the air cap 12, for example, with horns 16  
oriented along vertical axis 20 illustrated in Fig. 2 or along horizontal axis 22

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illustrated in Fig. 6, is not disturbed. To this end, the configuration of device 10 may advantageously be other than the illustrated generally right rectangular prism shape. For example, it could be a right circular cylindrical in shape with a grooved, knurled or otherwise textured sidewall to facilitate gripping and holding or turning by the  
5 worker.

Although this invention has been described in detail with reference to certain embodiments, variations and modifications exist within the scope and spirit of the invention as described and defined in the following claims.

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